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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/997,142	11/29/2001	Xiaoliu Liu	01-733	3417

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EXAMINER
EDGAR, RICHARD A

ART UNIT	PAPER NUMBER
3745	8

DATE MAILED: 08/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/997,142	LIU, XIAOLIU	
	Examiner	Art Unit	
	Richard Edgar	3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *an amendment filed 22 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Arguments

Applicant's arguments filed 22 July 2003 have been fully considered but they are not persuasive. New claims 11-15 have been added.

The amended abstract submitted by Applicant is now in compliance with 37 C.F.R. § 1.72(b). The examiner thanks Applicant for correction of this matter.

The examiner would like to thank Applicant for bringing to the examiner's attention the clerical error in the first Office action. Specifically, the examiner inadvertently rejected claims 1-4 and 6-9 under 35 U.S.C. § *102(b)* as anticipated by Flaherty et al. in view of Matthews et al., while the claims should have been rejected under 35 U.S.C. § *103(a)* as claims 1-4 and 6-9 were under Tran et al. in view of Matthews et al. Applicant further stated that a combination of references is not permitted under 35 U.S.C. § 102. While this argument is now moot, the examiner would like to remind Applicant that multiple references may be used under 35 U.S.C. § 102 when making rejections (see MPEP 2131.01).

Applicant first argues the Examiner's objection to the drawings for failure to show the oil scoop as recited in former claims 5 and 10. Applicant states that although the oil scoop was inadvertently left off Figure 2, its location and configuration would be apparent to one skilled in the art. This argument is not adequate to satisfy 37 C.F.R §1.83(a) which recites:

> The drawing in a nonprovisional application must show every feature of the invention specified in the claims. However, conventional features disclosed in the description and claims, where their detailed illustration is not essential for a proper understanding of the invention, should be illustrated in the drawing in the form of a graphical drawing symbol or a labeled representation (e.g., a labeled rectangular box).

Therefore recited claim features must be shown in the drawings. If the features are conventional they should be depicted by a graphical drawing symbol or a labeled representation. However, since Applicant has amended claims 5 and 10 to recite depicted elements, the objection to the drawings has been withdrawn.

Applicant next argues the teachings of United States Patent No. 6,142,729 issued to Tran et al.

Specifically, Applicant states that in typical gas turbine engine there is more than one bearing compartment, and Tran et al. only discloses a hydropad seal on a bearing cavity. Since Applicant's claims, as amended, now recite a plurality of bearings supporting at least one shaft along the shaft, Tran et al. in view of Matthews et al. cannot be said to teach all aspects of the claimed invention.

This argument is not persuasive.

While Tran et al. only show one bearing and associated seal in a single bearing chamber for illustrative purposes, the disclosure suggests the duplication of the sealing feature at every bearing chamber in a turbine engine since this sealing feature is not confined or limited to a specific bearing chamber. As is known by those skilled in the art, the different bearing chambers along the shafts of a turbine are operationally equivalent (i.e., they all circulate oil), therefore, one skilled in the art would be motivated

to apply the seal teaching of Tran et al. to every bearing chamber along the turbine shafts.

Applicant next notes that the references cited by the Examiner also all rely on the air pressure differential across the sealing surfaces to prevent oil leakage past the seals, further indicating the difference between the references and Applicants invention.

The examiner would like to note that all of the hydropad features or elements disclosed by Applicant are shown in the references of Tran et al. and Flaherty et al. More specifically, both Tran et al. and Flaherty et al. each teach a rotating ring (8 in Tran et al.; 28 in Flaherty et al.) with lift grooves (18 in Tran et al.; 26 in Flaherty et al.) fixed to the turbine shaft (1 in Tran et al.; 20 in Flaherty et al.) and abutting a stationary ring (7 in Tran et al.; 30 in Flaherty et al.). Also noteworthy is the location of the rotating rings and the stationary rings with respect to the oil chambers and the surrounding air chambers. Both of the references and Applicant's invention locate the rotating ring so that the volume of oil is located radially outwardly from the volume of air, so that under rotation the oil is forced radially outwardly by centrifugal force. And although both references teach a small volume of air being introduced into the bearing chamber, Applicant's invention must also introduce air into the bearing chamber since all of the elements are identically arranged. Applicant has not provided any additional teaching or element that would prevent air from entering into the bearing chamber under operational conditions of the seal. Therefore, Applicant's statement that the references teach away from the present invention is invalid since in order to teach away the

references and the invention must show something different than each other. Presently, the structures are identical.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 6,142,729 issued to Tran et al. (Tran et al. hereinafter) in view of United States Patent No. 4,531,358 issued to Smith (Smith hereinafter).

Tran et al. teach a method of minimizing oil consumption in a gas turbine engine by providing a seal between an air chamber 6 and a bearing (oil) chamber 5. A rolling bearing 3 is housed in the bearing chamber 5, wherein the bearing 3 supports a turbine shaft 1. The seal between the air chamber 6 and the bearing chamber 5 comprises a static carbon ring 7 associated with a rotary ring 8. The static carbon ring 7 is held in a fixed annular support 14. The rotary ring 8 is fixed by way of pins 10 to a sleeve 4 which is in turn fixed to the rotary shaft 1. Therefore, the rotary ring 8 rotates with the turbine shaft 1 as the static carbon ring 7 is fixed stationary relative to the rotating turbine shaft 1. The static carbon ring 7 abuts against the rotary ring 8. Below a lift-off speed, the static carbon ring 7 frictionally engages the rotary ring 8 due to a force exerted on the static carbon ring 7 by the associated spring 21. The rotary ring 8 is provided with lift grooves 18 (see Fig. 4) in the surface so that no appreciable friction is generated between the sealing surfaces of the static carbon ring 7 and the rotary ring 8.

Tran et al. limit their written disclosure to one bearing chamber in a turbomachine, therefore Tran et al. do not explicitly teach a plurality of bearing chambers in a turbomachine.

Smith shows in Fig. 1 a turbine having a low pressure shaft 7 arranged between the low pressure compressor or fan, and the low pressure turbine, and a high pressure shaft 8 arranged between the high pressure compressor and the high pressure turbine. Such an arrangement is conventional in turbine engines. The shafts 7, 8 are supported by bearings 9, 10, 11, 12, 13, housed in a plurality of bearing chambers 15, 16, 17. Now referring to Fig. 2 of Smith, a diagrammatic illustration of the bearing oil circuit is shown. Only one bearing chamber 15 is shown, however, the teaching is applicable to each bearing chamber 15, 16, 17. The bearing chamber 15 is arranged with an oil supply 23 and an oil scavenge pump 25 in communication with a bearing chamber outlet 24 on the bearing chamber outer periphery. Smith's oil circulating system enables oil to be circulated through every bearing chamber along each rotary shaft in the turbine engine for the purpose of lubricating all of the bearings.

Since Tran et al. teach a specific seal used in a bearing chamber of a gas turbine engine and Smith shows that there is conventionally more than one bearing chamber in a gas turbine engine, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to duplicate the seal teaching of Tran et al. which is shown in only one bearing chamber of a turbine engine, to include every bearing chamber in a turbine engine, since more than one bearing chamber is commonly used in turbine engines as shown by Smith, to have a plurality of bearing

chambers each having the sealing arrangement shown by Tran et al. for the purpose of lubricating all of the bearings located along the turbine shaft(s) in a turbine engine.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Edgar whose telephone number is (703) 305-0050. The examiner can normally be reached on Monday-Thursday and alternate Fridays 6:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on (703) 308-1044. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.

Richard Edgar
Examiner
Art Unit 3745

RE

EDWARD K. LOOK
SUPERVISORY PATENT EXAMINER
GROUP 3700
8/22/03